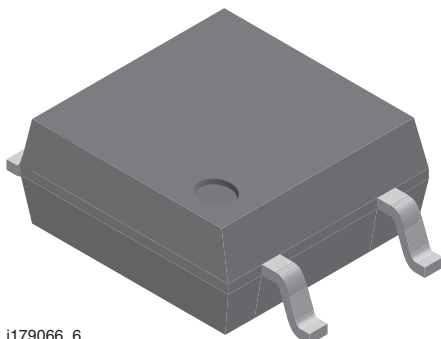
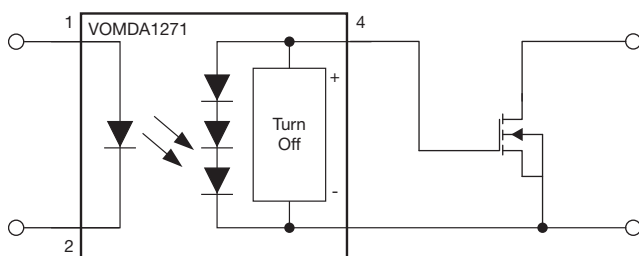
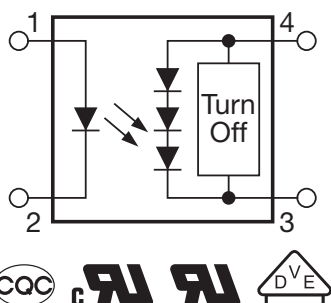


## Automotive Photovoltaic MOSFET Driver With Integrated Fast Turn-Off



i179066\_6



Single MOSFET Driver Application

### DESCRIPTION

The VOMDA1271 is an automotive qualified optically isolated MOSFET driver. The VOMDA1271 obtains all the required current to drive its internal circuitry from the infrared emitter on the low voltage, primary side of the isolation barrier. No power supply is needed to provide  $V_{CC}$ . The VOMDA1271 features a turn-off circuit to achieve a fast turn off of the MOSFET.

### FEATURES

- AEC-Q102 qualified
- Open circuit voltage of 8.5 V typical at  $I_F = 10$  mA
- Short circuit current at 15  $\mu$ A typical at  $I_F = 10$  mA
- Isolation test voltage 3750  $V_{RMS}$
- Operating temperature from  $-40$  °C to  $+125$  °C
- Material categorization:  
for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

AUTOMOTIVE  
GRADE

**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

### APPLICATIONS

- Automotive pre-charge relay
- Powerwall chargers
- Gate driver for High Voltage MOSFETs
- BMS
- Custom solid-state relays

### AGENCY APPROVALS

- UL (pending)
- cUL (pending)
- VDE (pending)
- CQC (pending)

### LINKS TO ADDITIONAL RESOURCES



Product Page


Application  
Notes


3D Models



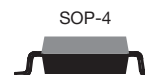
Models


Ultra  
Librarian  
EDA / CAD


Design Tools

**ORDERING INFORMATION**

|             |   |   |   |   |   |   |   |   |               |
|-------------|---|---|---|---|---|---|---|---|---------------|
| V           | O | M | D | A | 1 | 2 | 7 | 1 | T             |
| PART NUMBER |   |   |   |   |   |   |   |   | TAPE AND REEL |


**PACKAGE**

SOP-4

**UL, cUL, VDE, CQC**

VOMDA1271T

**Note**

- The product is available only on tape and reel

**ABSOLUTE MAXIMUM RATINGS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

| PARAMETER                           | TEST CONDITION                         | SYMBOL                        | VALUE       | UNIT                   |
|-------------------------------------|----------------------------------------|-------------------------------|-------------|------------------------|
| <b>INPUT</b>                        |                                        |                               |             |                        |
| LED continuous forward current      |                                        | $I_F$                         | 50          | mA                     |
| LED reverse voltage                 |                                        | $V_R$                         | 5           | V                      |
| Power dissipation                   |                                        | $P_{diss}$                    | 80          | mW                     |
| Power derating                      | $T_{amb} > 80\text{ }^{\circ}\text{C}$ | $\Delta P_D / \Delta T_{amb}$ | -1.3        | mW/ $^{\circ}\text{C}$ |
| <b>MOSFET DRIVER</b>                |                                        |                               |             |                        |
| Power dissipation                   |                                        | $P_{diss}$                    | 2           | mW                     |
| Ambient operating temperature range |                                        | $T_{amb}$                     | -40 to +125 | $^{\circ}\text{C}$     |
| Storage temperature range           |                                        | $T_{stg}$                     | -40 to +150 | $^{\circ}\text{C}$     |
| Pin soldering temperature           | $t = 10\text{ s}$                      | $T_{slid}$                    | 260         | $^{\circ}\text{C}$     |

**Note**

- Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability.

**ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

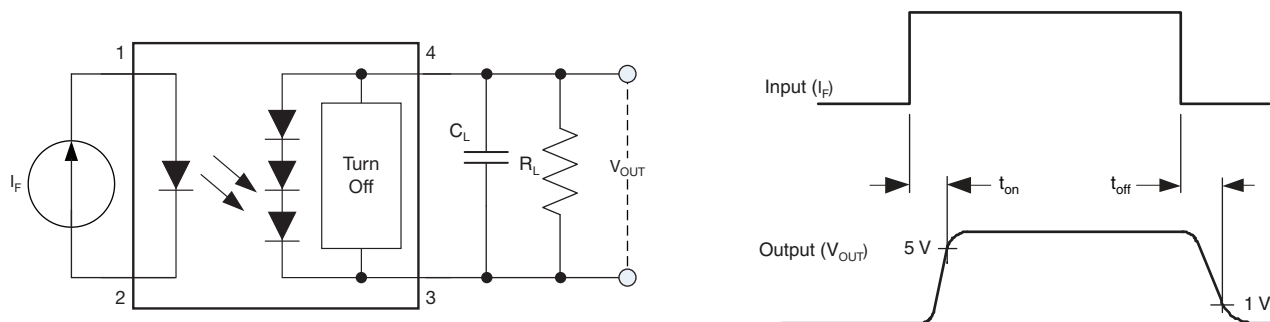
| PARAMETER             | TEST CONDITION       | SYMBOL   | MIN. | TYP. | MAX. | UNIT          |
|-----------------------|----------------------|----------|------|------|------|---------------|
| LED forward voltage   | $I_F = 10\text{ mA}$ | $V_F$    | 1.3  | 1.4  | 1.5  | V             |
| Open circuit voltage  | $I_F = 5\text{ mA}$  | $V_{OC}$ | -    | 8.2  | -    | V             |
|                       | $I_F = 10\text{ mA}$ | $V_{OC}$ | 6.5  | 8.5  | -    | V             |
|                       | $I_F = 20\text{ mA}$ | $V_{OC}$ | -    | 8.8  | -    | V             |
| Short circuit current | $I_F = 5\text{ mA}$  | $I_{SC}$ | -    | 7    | -    | $\mu\text{A}$ |
|                       | $I_F = 10\text{ mA}$ | $I_{SC}$ | 8    | 15   | -    | $\mu\text{A}$ |
|                       | $I_F = 20\text{ mA}$ | $I_{SC}$ | -    | 35   | -    | $\mu\text{A}$ |

**Note**

- Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluations. Typical values are for information only and are not part of the testing requirements.

**SWITCHING CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

| PARAMETER     | TEST CONDITION                                                                                                        | SYMBOL    | MIN. | TYP. | MAX. | UNIT          |
|---------------|-----------------------------------------------------------------------------------------------------------------------|-----------|------|------|------|---------------|
| Turn-on time  | $C_L = 200\text{ pF}$ , $R_L = 10\text{ M}\Omega$ , $I_F = 20\text{ mA}$ ,<br>$P_W = 2\text{ ms}$ , duty cycle = 50 % | $t_{on}$  | -    | 32   | -    | $\mu\text{s}$ |
| Turn-off time |                                                                                                                       | $t_{off}$ | -    | 80   | -    | $\mu\text{s}$ |

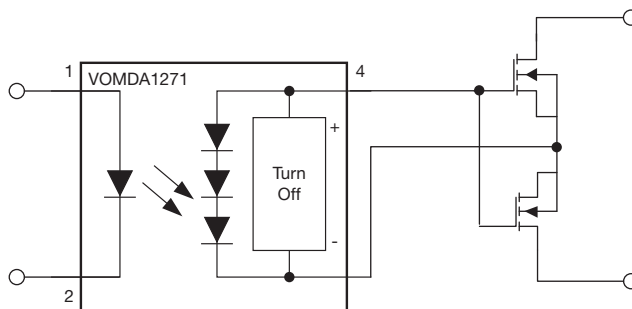

Fig. 1 -  $t_{on}$ ,  $t_{off}$  Test Circuit and Waveforms

| SAFETY AND INSULATION RATINGS                |                                                                                                             |            |                |             |
|----------------------------------------------|-------------------------------------------------------------------------------------------------------------|------------|----------------|-------------|
| PARAMETER                                    | TEST CONDITION                                                                                              | SYMBOL     | VALUE          | UNIT        |
| Climatic classification                      | According to IEC 68 part 1                                                                                  |            | 40 / 125 / 21  |             |
| Pollution degree                             | According to DIN VDE 0109                                                                                   |            | 2              |             |
| Comparative tracking index                   | Insulation group IIIa                                                                                       | CTI        | 175            |             |
| Maximum rated withstanding isolation voltage | According to UL1577, $t = 1$ min                                                                            | $V_{ISO}$  | 3750           | $V_{RMS}$   |
| Maximum transient isolation voltage          | According to DIN EN 60747-5-5                                                                               | $V_{IOTM}$ | 6000           | $V_{peak}$  |
| Maximum repetitive peak isolation voltage    | According to DIN EN 60747-5-5                                                                               | $V_{IORM}$ | 707            | $V_{peak}$  |
| Isolation resistance                         | $T_{amb} = 125^{\circ}C$ , $V_{IO} = 500$ V                                                                 | $R_{IO}$   | $\geq 10^{12}$ | $\Omega$    |
|                                              | $T_{amb} = T_S$ , $V_{IO} = 500$ V                                                                          | $R_{IO}$   | $\geq 10^{11}$ | $\Omega$    |
| Output safety power                          |                                                                                                             | $P_{SO}$   | 350            | mW          |
| Input safety current                         |                                                                                                             | $I_{SI}$   | 150            | mA          |
| Input safety temperature                     |                                                                                                             | $T_S$      | 175            | $^{\circ}C$ |
| Creepage distance                            | SOP-4                                                                                                       |            | $\geq 5$       | mm          |
| Clearance distance                           |                                                                                                             |            | $\geq 5$       | mm          |
| Input to output test voltage, method B       | $V_{IORM} \times 1.875 = V_{PR}$ ,<br>100 % production test with $t_M = 1$ s,<br>partial discharge $< 5$ pC | $V_{PR}$   | 1326           | $V_{peak}$  |
| Input to output test voltage, method A       | $V_{IORM} \times 1.6 = V_{PR}$ ,<br>100 % production test with $t_M = 10$ s,<br>partial discharge $< 5$ pC  | $V_{PR}$   | 1131           | $V_{peak}$  |

**Note**

- As per DIN EN 60747-5-5, § 7.4.3.8.2, this optocoupler is suitable for “safe electrical insulation” only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits.

## APPLICATION EXAMPLES



Bidirectional MOSFET Driver Application

Fig. 2 - Typical MOSFET Driver Applications With Integrated Turn-Off Functionality

## TYPICAL CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

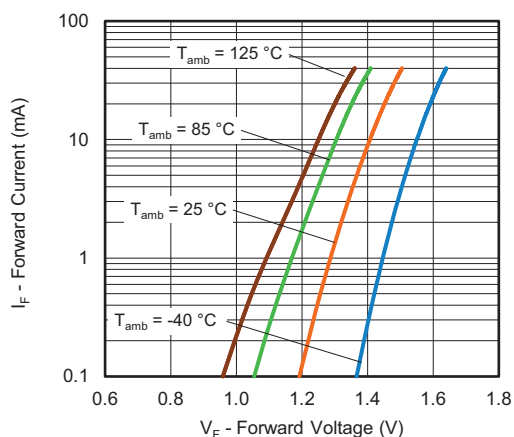


Fig. 3 - Forward Current vs. Forward Voltage

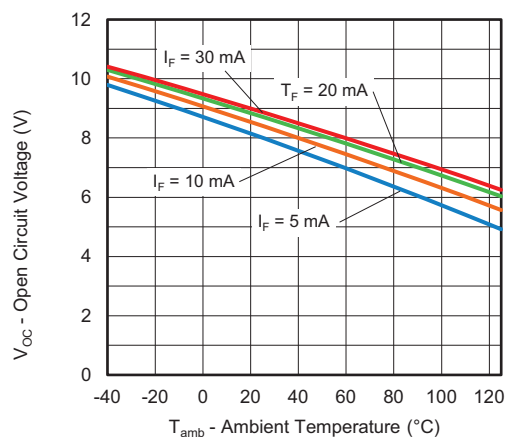


Fig. 5 - Open Circuit Voltage vs. Ambient Temperature

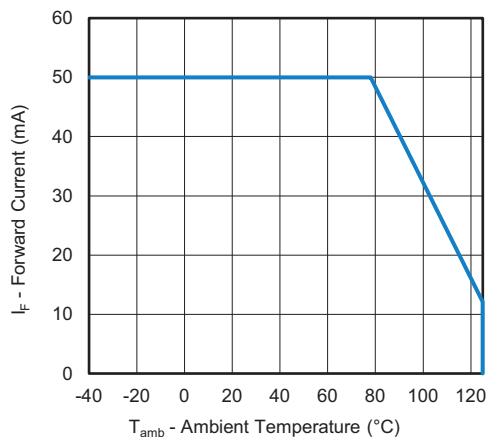


Fig. 4 - Forward Current vs. Ambient Temperature

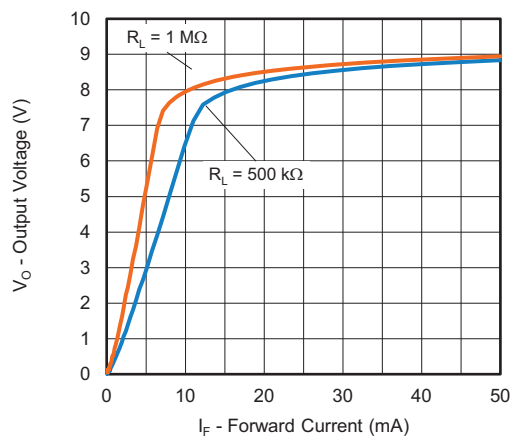


Fig. 6 - Output Voltage vs. Forward Current

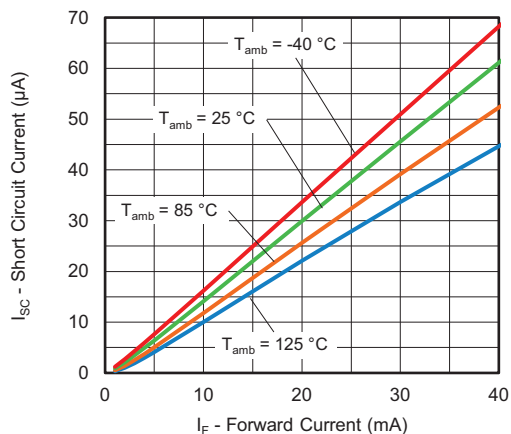


Fig. 7 - Short Circuit Current vs. Forward Current

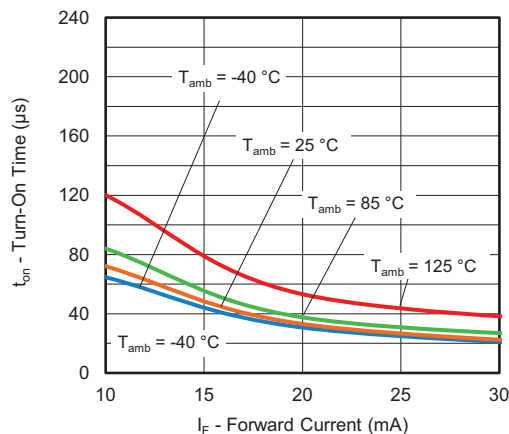


Fig. 10 - Turn-On Time vs. Forward Current

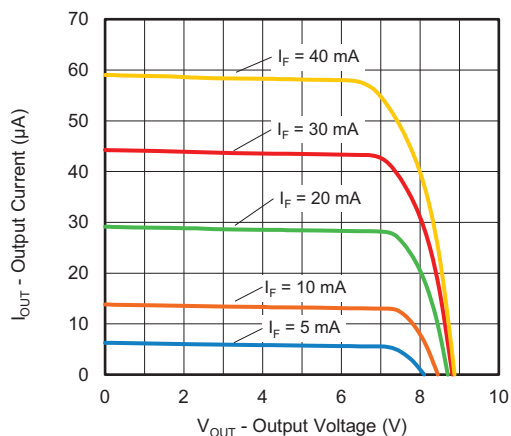


Fig. 8 - Output Current vs. Output Voltage

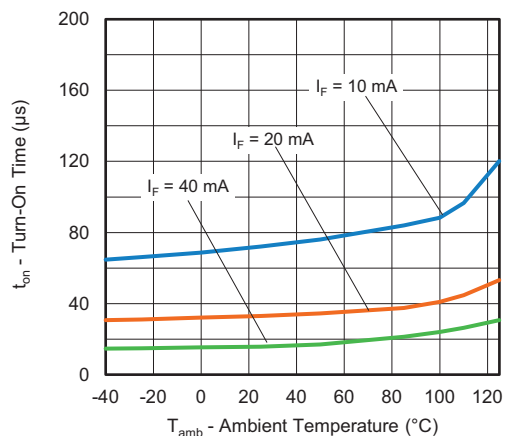


Fig. 11 - Turn-On Time vs. Ambient Temperature

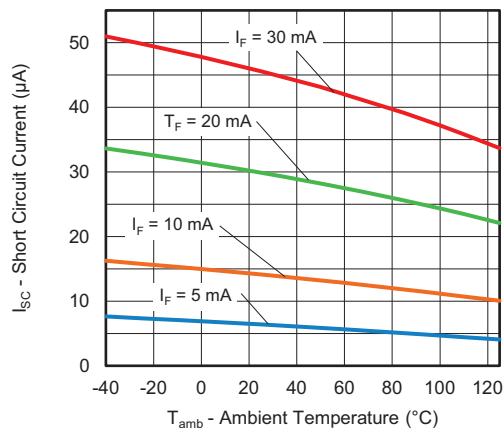


Fig. 9 - Short Circuit Current vs. Ambient Temperature

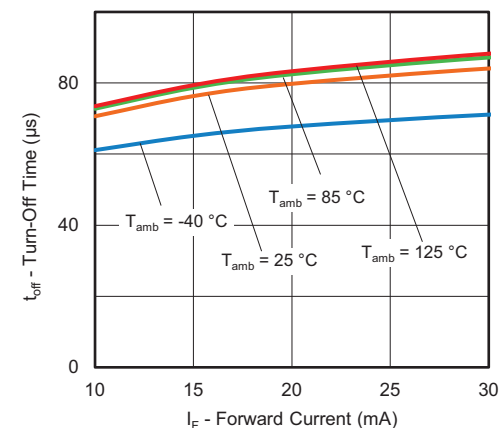


Fig. 12 - Turn-Off Time vs. Forward Current

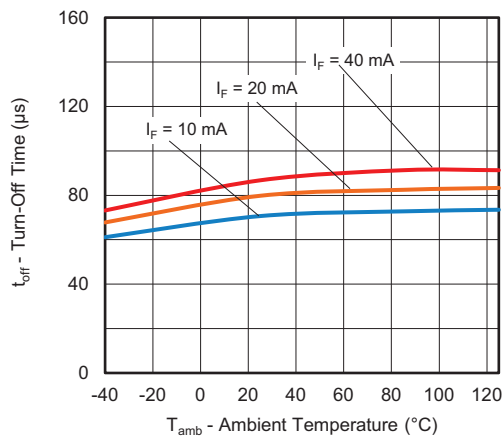


Fig. 13 - Turn-Off Time vs. Ambient Temperature

### PACKAGE DIMENSIONS (in millimeters)

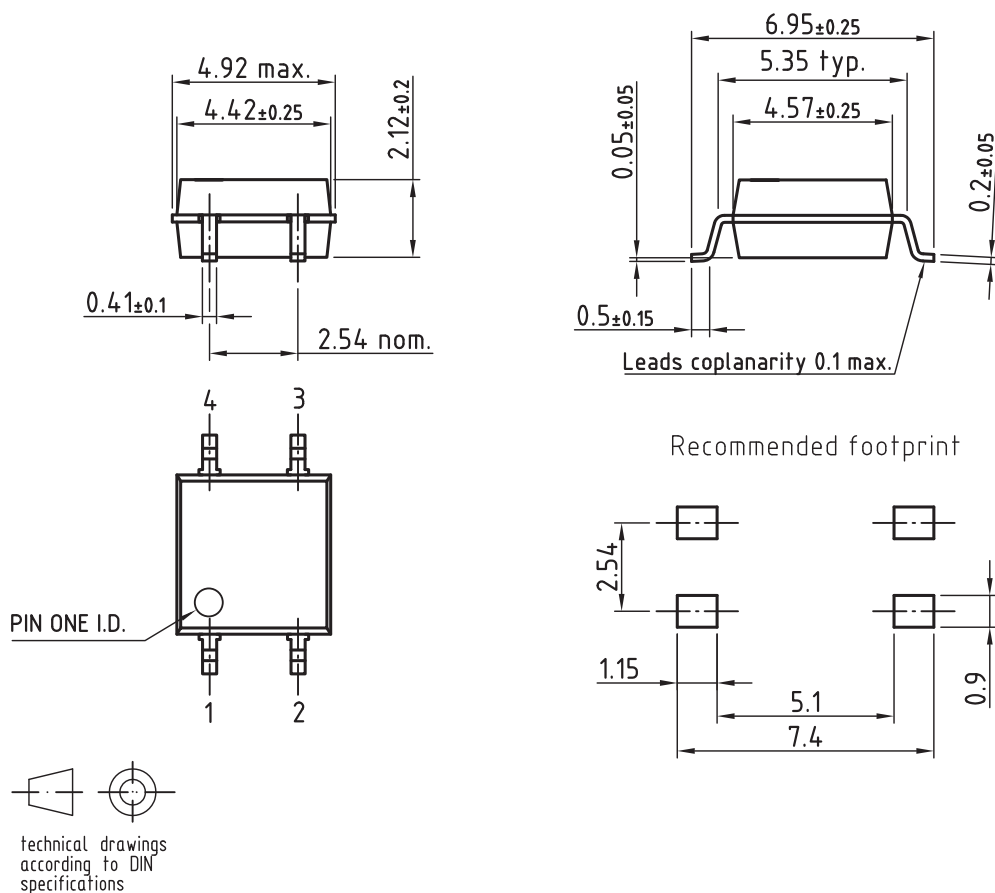


Fig. 14 - Package Drawing

## PACKAGE MARKING

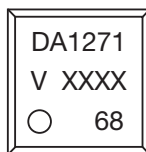


Fig. 15 - VOMDA1271

### Notes

- XXXX = LMC (lot marking code)
- Package configuration (T, M) are not part of the package marking

## TAPE AND REEL PACKAGING

Dimensions in millimeters

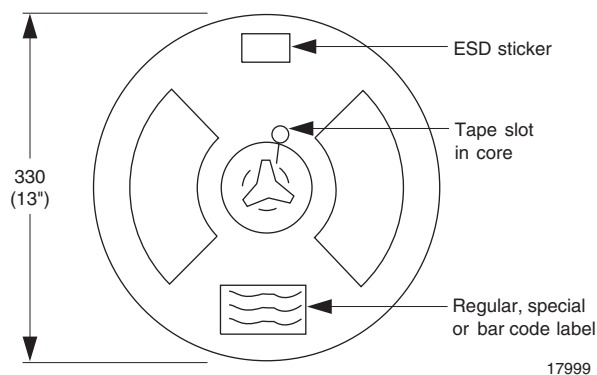
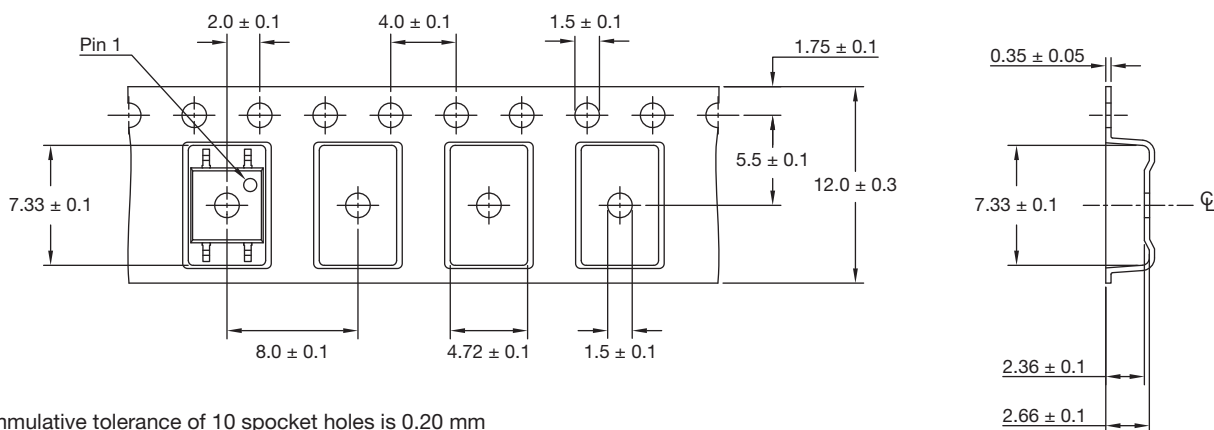


Fig. 16 - Tape and Reel Shipping Medium  
(EIA-481, revision A, and IEC 60286), 2000 units per reel



### Note:

- Cummulative tolerance of 10 spocket holes is 0.20 mm

Fig. 17 - Tape and Reel Packing (2000 pieces on reel)

## SOLDER PROFILES

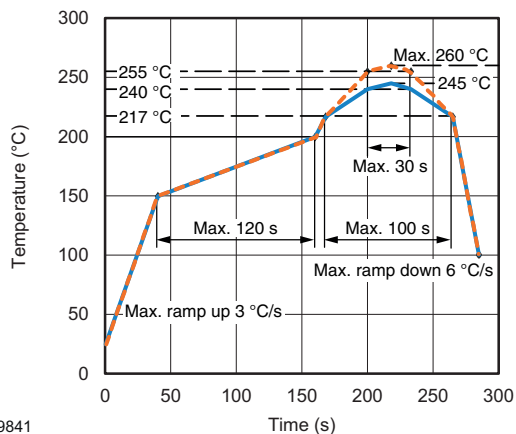


Fig. 18 - Lead (Pb)-free Reflow Solder Profile  
According to J-STD-020 for SMD Devices

## HANDLING AND STORAGE CONDITIONS

ESD level: HBM class 2

Floor life: 168 h

Conditions:  $T_{amb} < 30\text{ °C}$ ,  $RH \leq 60\%$

Moisture sensitivity level 3, according to J-STD-020



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